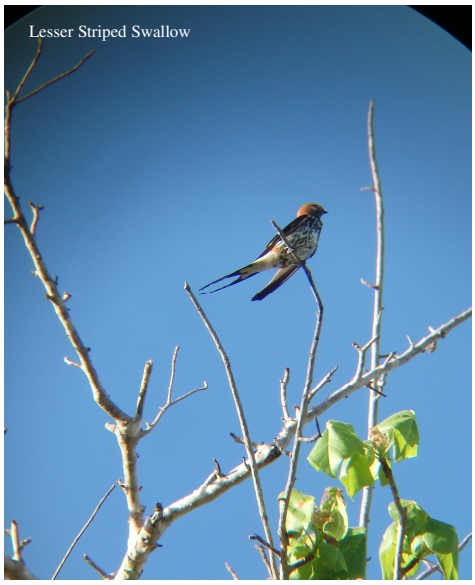
Fall 2013

Species Censes & Local Conceptions of Ornithological Fauna, Uzi

Alexandria Vandervest
SIT Study Abroad



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Alexandria Vandervest
Hope College
Advisors: Alawi Hija & Aliy Abdurahim Ailiy
School For International Training: Costal Ecology and Natural Resource Management, Tanzania
Academic Director: Nat Quansah
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Abstract

Uzi Island is a rapidly growing and developing island with a wealth of flora and fauna found in very few other places around the world. Study is needed in every field, this was a preliminary study into the residential and migrant bird species presence on Uzi Island. Birds were observed in two of the main habitats present on Uzi Island, intertidal/mangrove and coral-rag. Three transects were cut and laid through each of the two habitats and monitored in the morning and evening hours over the course of 20 days. A total of 1949 birds were recorded comprising 71 species (708 individuals/ 40 species in intertidal/mangrove and 1241 individuals/ 48 species in the coral-rag habitat).The intertidal/mangrove and coral-rag habitats had cumulative Simpsons indices means of 0.25 and 0.17 respectively ($p=0.03$, $df=45$, $t=2.2029$). Human survey data was also collected following a questionnaire of open-ended questions. Inhabitants of Uzi Island could name a range of 2-26 species of birds, and in general agreed that birds: are important, affected by the health environment, indicate the health of the environment, and are disturbed by villagers. Subjects overall conveyed a positive view of birds and responded positively to the question "what do we get from watching birds". Recommendations were proposed for future in-depth research.

I Introduction

Ecotourism is the "responsible travel to natural areas that conserves the environment and improves the well-being of local people" according to the International Ecotourism Society and referenced by C. H. Sekercioglu (2002). Parks and protected areas all over Africa are benefiting highly from a recent tourism focus on ecotourism (Lindsey et al, 2007). Visitors not only desiring to view the "large predators and mega-herbivores" but are also interested in "bird and plant diversity, scenery, and rarer, less easily-observed and/or less high profile mammals" (Lindsey et al, 2007). Birdwatching, birding, is a growing economic influx as a hobby interest, with "the number of birdwatchers in the USA has increased by 332%" since 1983 (Sekercioglu, 2002).

Birds act not only a mode for conservation but the vehicle for monitoring the need for and progress of conservation. According to Bennun et al (2002), birds are ideal indicators because birds are "well-studied, taxonomically stable, easily surveyed, widely-distributed across almost all habitats and include both generalized and specialized species" (Bennun et al, 2002). The monitoring of particular bird species or species richness as a whole may offer a warning of environmental destruction and danger or indicate recovery and stability.

Used as hobbies, indicators and more, birds are the subject of social and scientific interest. Numerous methods of "bird-watching" and recording have been developed by hobbists and ornithologists alike. These standardized methods allow comparable studies to be performed globally and across the expanse of time. Commonly utilized methods include point counts, and/or line transects (Bibby et al, 2000). Line transect data collection includes constant

movement along a designated path and continuous measurement, while point count data collection involves the researcher moving between set points and taking standing measurements (Bibby et al, 2000). Each method having its own variations, as well as pro and cons measuring a number of variables: species richness, species diversity, bird densities, individuals or a single species, and bird habitat preferences (Bibby et al, 2000).

Recent studies within the ecosystem variations of the Western Indian Ocean have manipulated afore mentioned bird observation methods to survey bird fauna. One such study observing the small isolated island of Misali noted a total of 26 species over the course of 20 days (Taussig, 2007). A second study also focusing on a little studied area was that of Hart Webb on the island of Chumbe. Over 20 days, 34 species of birds were noted, 12 being migratory species (Webb, 2003). A similar situation of Chumbe and Misai Islands, Uzi Island is home to a host of bird species partially isolated and under-studied.

Developing to accommodate tourists Uzi Island offers many ecotourism attractions, including turtle watching and village tours (Uzi Island Conservation Society, 2013). Developing on the island is the Uzi Island Conservation Society, and NGO founded in 2012. The NGO works with Zenith Tours and World Unite to develop ecotourism and encourage education on Uzi island (Uzi Island Conservation Society, 2013). There is much research needed on Uzi Island to take census of the current flora and fauna as little has been done in the past. Many inhabitants of the island are going unnoticed and some disappearing as expired indicators. Currently there is no record of the birds species present on the island and no species censes have been taken. The focus of the study is to create a living record of Uzi Islands' bird species and to record a preliminary censes of bird populations on Uzi's two main terrestrial habitats: intertidal/mangrove habitat and coral-rag forest habitat. Local concept of birds and their environmental interactions

were also assessed, as local aid is the key to sustaining current species and protecting the environment.

II Study Area

Uzi Island is located south of Unguja in the Western Indian Ocean, Uzi Island is approximately 6 km in length (US Dept of State Geographer, 2013) and is connected to Unguja by a single road. Subject to the tide Uzi is reachable by vehicle or boat during high tide. The population of Uzi is approximately 7000 persons who commonly work as farmers, fishermen, and seaweed farmers (Aily & Issa-haka, 2013). There are no resident doctors living on the island and many children traverse to attend schools on Unguja daily (Aily & Issa-haka, 2013).

Uzi Island is located in the Menai Bay Conservation area, a 467.5 square kilometer area where non-destructive fishing is encouraged and enforced (Menai Bay Conservation Area, 2013). The six observed point transect lines concentrated on either the coral-rag forests or mangrove/intertidal habitats on Uzi.

Transects encompassed mangrove/intertidal habitats as far north as the southern edge of Jozani Chwaka Bay National Park and coral-rag forest areas as far south as the southern edge of the village of Ng'ambwa. Transects also spanned the western edge of Ng'ambwa village and the western shore of Uzi island. Apart from the coastal waters of the Menai Bay Conservation Area, there is no protected habitats on Uzi Island and therefore none is specifically targeted in the study area. Intertidal habitat encircles Uzi but mangroves are located solely on the northern shore. Coral rag habitat covers the whole of Uzi but untouched forest is nearly non-existent and scattered. The largest portion of undisturbed coral-rag forest is located in south-west Uzi. Half of the observed transects were chosen to survey mangrove/intertidal habitat and half were chosen to survey coral-rag forest (refer to Appendix 1, Figures 1 & 2).

Transects 1-3 were classified as the intertidal/mangrove habitat. Transect 1 was the only strictly intertidal transect and was strung along the western edge off Uzi. Transect 1 was surveyed on foot and only during the lowest tides. Transect 2 spanned from just north of the village of Uzi to northwest Uzi. Transect 2 was surveyed only with canoe, the substrate in some places was composed of sink-mud and was dangerous. Transect 2 crossed the only road to Uzi, therefore the levels of tide were highly important and monitored. Transect 3 followed east to west along the mangroves south of Jozani Chwaka Bay National Park. Transect 3 was partially accessible on foot but only point A-D. Point E-H were comprised of sink-mud substrate and it was decided to take a canoe along transect 3.

Transects 4-6 were noted as coral-rag habitat. Transect 4 began south east of Uzi and continued in this direction until nearly reaching the western shore of Uzi. Transect 5 began south and slightly east of point H in transect 4. Transect 5 moved west to east with a jog in the transect to the south at point F. The jog to the south was corrected shifting point G north. This jog made transect 5 more difficult to navigate. Transect 6 headed northeast from the south into the village of Ng'ambwa.

III Methodology

A Ornithological Survey/ Census

Study transects areas were chosen both randomly and through convenience and according to standardized protocols laid out in "A Standard Method for Monitoring Songbird Populations in the Great Lakes Region" (Howe et al, 1997) and "Bird Census and Survey Techniques" (Gregory et al, 2004). Using Google Earth maps (US Dept of State Geographer, 2013), a grid was drawn over the island of Uzi. Beginning in the north-west corner of Uzi every fifth grid was marked as if reading lines from left to right. From the approximately 20-30 chosen grid squares measuring 3,600 m^2 each, 6 were chosen by hand. Grid squares fitting habitat criteria were chosen under the guidance of Aliy Abdurahim Aliy and Iss-haka Hussein Abdulah. Three study transects were chosen out of the grid squares lying over known mangroves and intertidal areas and three were chosen over area considered to be comprised of more forest than farm. The six final grid squares were chosen by hand to ensure that the desired sampling areas were chosen and to prevent any one transect from crossing another. The chosen grid square served only as the area in which the transect had to start. The direction of the transect was determined by ease of access, desired habitat to cover, and to prevent any single transect from crossing another or passing too close to another (refer to appendix 1, Figures 1 & 2).

Transects were laid over three days from November 4, 2013 to November 7, 2013. With GPS, the center of the six chosen grids was proceeded to and point A placed. Transects through forest were cut with machete if necessary but pre-existing footpaths were used if present and coincided with desired direction from point to point. If the first point landed near a substantially disturbed area (ie- village), the first point was moved approximately 150 meters into less disturbed area. From the first point seven more points were marked 200 meters apart following

the direction pre-determined with Google Maps. Points were marked with orange ribbon coded with transect number and the point letter and marked on a hand-held Garmin GPS unit. The purely intertidal transect was only marked with GPS due to the nature of the area. There would have been no appropriate place to leave a marker. Markers were tied to trees and bushes approximately face height or noted when tied to the ground on coral-rag.

The six transects were observed six times each. Each was observed three times in the early morning, between the hours of 6:04am and 9:49am, and three times in the late afternoon, between 2:43pm and 6:40pm (transect 5 was observed 4 mornings and 2 evenings). These times were selected as the periods of highest bird activity (Bibby et al, 2000). Upon reaching each point, a two minute settling period was observed to off-set the flushing effect. Data was then collected for eight minutes following the two minute wait. General data recorded included: date, time, observer/s temperature approximation, percent cloud cover, wind speed according to the Beaufort scale and the transect number. All bird sightings within 30 meters of the designated point were recorded. Species data collected included: assigned species code, method of identification, the number of individuals sighted and extra notes (refer to Appendix 2, Figure 1). Species codes are four letter combinations created and given as each new species was added to the species censes. Bird species were identified with the use of African bird guides: *Birds of Kenya & Northern Tanzania* (Zimmerman, 1999) and *Birds of East Africa, Kenya, Tanzania, Uganda, Rwanda and Burundi* (Stevenson, 2002). Aliy Abdurahim Aliy aided with the identification of birds visually and by vocalization. Bird families were identified with *The Birds of Zanzibar and Pemba: An Annotated Check-list* (Packenham, 1979). Methods of identification may have included “typical” in which the bird landed within 30 meters of the point, “fly-over” in

which the bird passed within 30 meters of the point but did not land, and/or "call" where the species was determined by vocalization.

Data collection areas were initially random but the necessity to work around the tide assigned transects one to three as priority during high or low tide. The coral-rag habitat transects were then alternated for observation.

Data was recorded on prepared data sheets and retained as both paper and electronic forms. Data was compiled with excel spread sheets. Species abundance was determined for each species using all the recorded data of all birds from each transect. Species abundance is the total number of individuals of each species divided by the total number of all individuals of all species observed and multiplied by one hundred. Species richness was calculated as the total number of observed species for the intertidal/mangrove and coral-rag forest environments separately. The average number of each bird species from each point in each transect was used to calculate a total of 28 Simpson's Indices. Simpson's Index is a measure of species diversity and calculated as $D = \sum (n/N)^2$, where n = the total number of organisms of a particular species and N = the total number of organisms of all species (Simpson's Diversity Index, 2013). The output if Simpson's Index is a number between 0 and 1, a higher number representing lower diversity (Simpson's Diversity Index, 2013). These indices were combined into two graphs, one of each observed habitat. Simpson's indices were also calculated for each habitat separately by combining all replicate point data from each transect in the desired habitat.

All species encountered were compiled into a table with each species Kiswahili name, genus and species names, family, assigned code, date, total number of individuals recorded and calculated species abundance.

B Human Interview

Adult subjects were selected randomly between the hours of approximately 10:00 am-1:30pm around both Uzi and Ng'ambwa villages. Only one afternoon of five interviews were collected in Ng'ambwa. The hours of interview were chosen as the time in-between transect observations. Subjects were interviewed in Kiswahili with pre-determined questions (refer to Appendix 2, Figure 2) and the aid of a translator. The translator aided in the understanding of the question posed and conveyed in English the subject's responses. Subjects were asked prior to each interview for verbal consent to interview, as many may not have desired or been able to produce a signature. Subjects were asked for a written consent following the survey if possible.

Graphs were compiled of: how many species of birds subjects could name, what subjects thought when seeing birds in Uzi, if subjects thought the birds are important, if the subjects thought birds are disturbed by villagers, if the subjects thought birds are affected by the environment, and the category of indicator of bird response given. Data was also complied if the subject mentioned the Indian House Crow in a negative way during the interview, if a chicken was mentioned as a bird, a list of the "special" birds named, a list of the most common "important" bird species named, if birds are hunted on Uzi and categorized responses to the question "what do we get from watching birds".

III Results

A Ornithological Survey/ Census

A total of 1949 birds and a species richness of 59 was recorded during official transect recording times. In total 71 species were identified by either call or visually, and an unrecorded number of individuals out of official transect recording times (refer to Appendix 3, Figure 1).

708 individual birds comprised of a species richness of 40 were recorded collectively in transects 1 through 3, the intertidal/mangrove habitat. Transect 1 Simpson Indices values are 0.44, 0, 0.67, 0.36, 0.63, 0.50, 0.56, and 1.00 for points A, B, C, D, E, F, G and H respectively (sd = 0.28). Transect 2 Simpson Index values are 0.13, 0.31, 0.12, 0.11, 0.11, 0.20, 0.20, and 0.20 respectively for points A, B, C, D, E, F, G, and H (sd = 0.07). Transect 3 Simpson Index values are 0.12, 0.17, 0.12, 0.12, 0.15, 0.13, 0.14, and 0.34 for points A, B, C, D, E, F, G, and H respectively (sd = 0.07) (refer to Figure1). The Simpsons Index for all intertidal/mangrove habits (transects 1-3) combined is 0.10

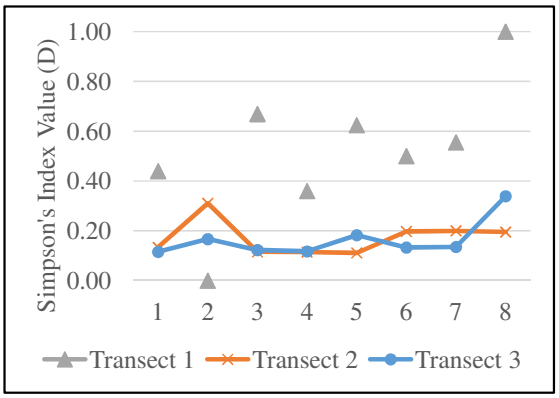

Figure 1 - Simpson's Index (D) of mangrove/intertidal habitat transects (1-3) by point. Transect 1 points not connected to display disjunction due to excessive flush distance.

In the coral-rag habitat a species richness of 48 and 1241 individual birds were recorded (transects 4-6). Transect 4 Simpson Index values are 0.26, 0.19, 0.12, 0.18, 0.16, 0.16, 0.09, and 0.24 for points A, B, C, D, E, F, g, and H respectively (sd=0.06). The Simpson Index values for points A, B, C, D, E, F, G, and H of transect 5 are 0.15, 0.20, 0.22, 0.19, 0.15, 0.11, 0.10,and 0.18 respectively (sd=0.04). The Simpson Index values

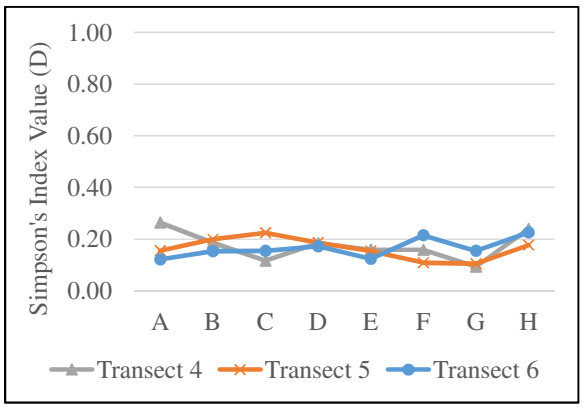

Figure 2 - Simpson's Index (D) of coral-rag habitat transects (4-6) by point.

for transect 6 points A, B, C, D, E, F, G, and H are 0.12, 0.15, 0.15, 0.17, 0.12, 0.21, 0.15, and 0.23 respectively (sd=0.04) (refer to Figure 2). The combined coral-rag habitat Simpsons Index is 0.13.

The Simpson's indices of the points within the intertidal/mangrove habitat are significantly greater than the Simpson's indices of the points within the coral-rag habitat with means of 0.25 and 0.16 respectively (df=45, t=2.2029, p=0.03).

The top five most abundant species included: Zanzibar Somber Greenbul, the Indian House Crow, the Cattle Egret, the Red Eye Dove and the Madagascar Bee-Eater with relative abundances of 24.99, 12.22, 6.47, 5.69 and 3.89% respectively. The least abundant species included: the Black Heron, the Black-Backed Puffback, the Blue-Mantled Crested Flycatcher, the Common Sandpiper, the Crab-Plover, the East Coast Akalat, the Red-Capped Robin-Chat, the Striped Kingfisher, the Little Greenbul and the Tropical Boubou all with a relative abundance of 0.06 (1 official individual recorded).

B Human Interview

Fifty subjects were surveyed between November 13, 2013 and November 19, 2013. Data from 49 of these subjects was complied. One of the 50 subjects was incidentally a minor and the data discarded. Of the 49 included subjects, 22 were female and 27 male between the approximate ages of 19 and 65 years. Age is approximate as many of the aged subjects were unsure of his/her age.

The occupations of subjects included: seaweed farmer, farmer, mason, fishermen, embroidery, coconut climber, fisheries officer, stone crushing, carpenter, driver, sewing fishing nets, shop keeper, ox-cart rider, student, baby-sitter, nursery school teacher and/or unemployed.

When asked “are there any birds on Uzi that you can name? Please mention” subjects were able to name a number of birds between 2 and 26. Individuals were placed in groups according the number of species named (refer to Figure 3).

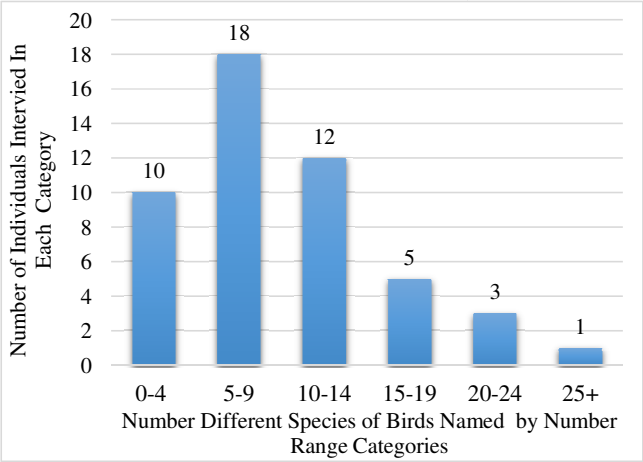

Figure 3 – Human survey reply to “are there any birds on Uzi that you can name” Displayed as number of individuals in categories of species named.

Posed the question of "what do you think when you see birds in Uzi?" responses were categorized as positive, negative, to protect the birds, to consume the birds, to capture/keep the bird or neutral. 15 responded in a positive way replying "happy", "content", etc.... 12 subjects answered with desire to capture and keep the birds. 8 subjects thought to consume the birds, 7 were neutral and 3 desired to protect the birds. One participant replied with an over-all negative response. Three subjects responded each differently. One subject replied positively but decided "destructive birds should leave", one stated birds made them both happy but were also to be consumed and one participant indicated that seeing birds indicates the presence of a snake in the area (refer to Figure 4).

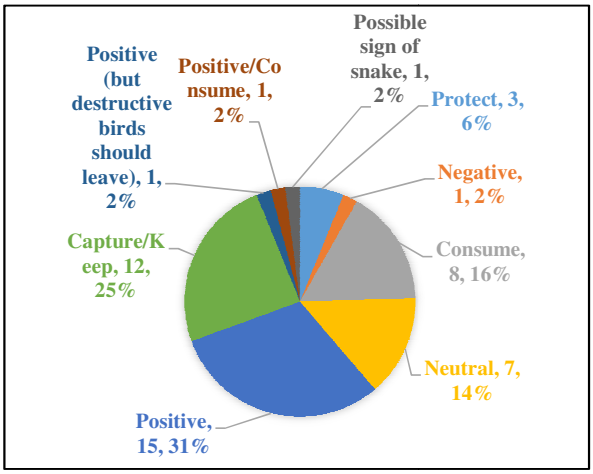

Figure 4 - Human survey reply to "what do you think when you see birds in Uzi".

Asked "are birds important?" responses included: yes, yes/very, no, and yes/some of them. The number of those responding "yes" was the greatest with 27, "yes/very", "yes/some of them" and "no" were 17, 3 and 2 responses respectively (refer to Figure 5).

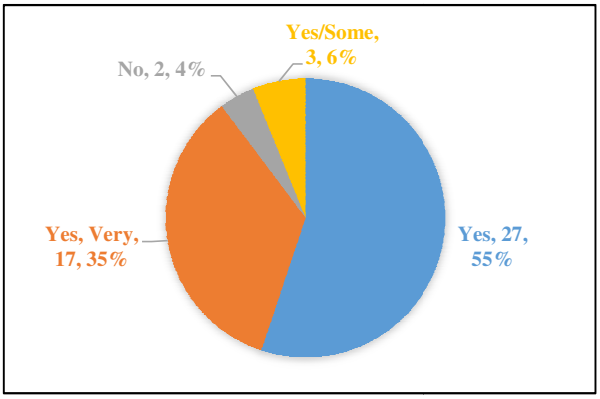

Figure 5 - Human survey reply to "are birds important".

Responding to “what do we get from watching birds?” 32/49 responses were categorized as positive. Three responses were of the desire to capture and keep the birds, while six replied to get knowledge from observing birds. Three individuals thought to be receiving nothing from watching bird, “they have their lives and we have ours”. One respondent each answered to get scenery and colors from watching birds. One respondent each also replied that birds: are community animals and eat dangerous snakes and insects. One individual desired to play with the birds.

“Special birds in Uzi” according to subject responses included: the Cardinal Woodpecker (2), the Cattle Egret (3), the Chicken (4), the Common Bulbul (1), the Crested Guinea-fowl (2), the Indian House Crow (5), the Eastern-Bearded Scrub Robin (2), the Green Wood-Hoopoe (5), the Lilac-Breasted Roller (3), a Pigeon (domesticated) (6), the Red-capped Robin-Chat (1), the Scarlet-Chested Sunbird (1), the Senegal Plover (2), the Lesser Striped Swallow (1), Weavers (4-species not specified), the Whimbrel (1), the White-Browed Coucal (1), the Yellow-Rumped Tinkerbird (1) and an unknown bird that “cleans water pools” (1). Number of times mentioned included in parenthesis behind the common name.

Asked “Do you think birds are disturbed by villagers” 34 subjects responded “yes”, 13 subjects replied “no”, 1 subject responded “yes and no” and one subject responded “sometimes” (refer to Figure 6).

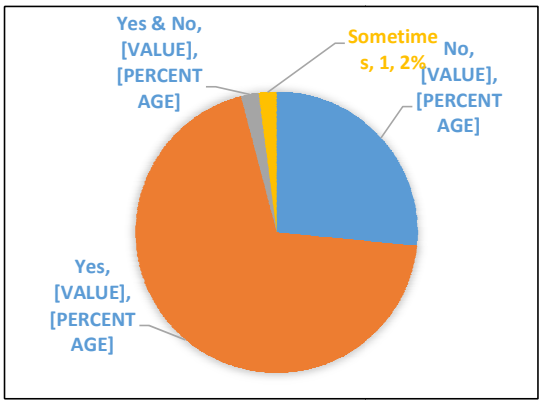

Figure 6 – Human survey reply to “do you think birds are disturbed by villagers”.

Subjects responded ”not sure”, “some/sometimes”, “yes”, “by kids” and

"no" that birds are/are not hunted on Uzi Island. The total of each response was 1, 2, 14, 14, and 18 respectively.

In response to "do you think birds are affected by the condition of the environment?" subjects responded neutrally (1), "some" (1), "no" (15) and "yes" (32). Number of each response included following each response category (refer to Figure 7)

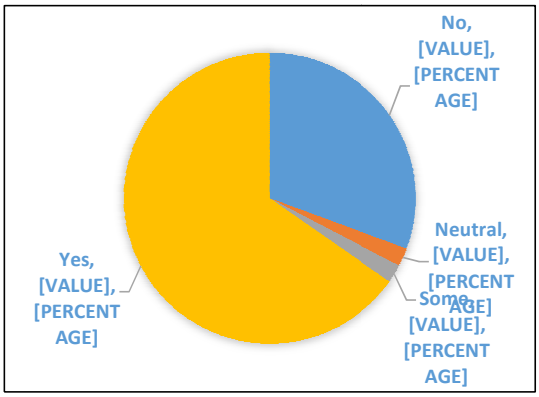

Figure 7 – Human survey reply to "do you think that birds are affected by the condition of the environment".

Asked "do you think birds tell us how healthy the environment is?" responses included "no" (1), "yes" (45) and unsure (2). One subject did not respond to the question. 43 of 49 respondents then went on to describe how birds then acted as indicators. Replies included "traditional", scientific", "no", and "both" (scientific and traditional) (refer to Figure 8

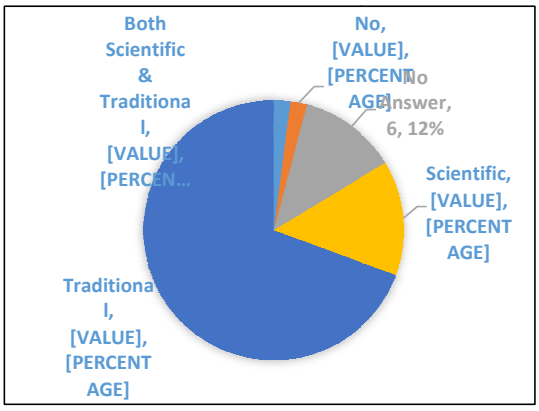

Figure 8 – Birds as indicators. Responses categorized as "traditional", "scientific" or "Both – Scientific & Traditional". Six subjects did not elaborate on question "do you think birds tell us how healthy the environment is".

During the interviews 15 of 49 subjects named a chicken as a "bird in Uzi they could name". 14 of 49 interviewees mentioned the Indian House Crow "kunguru" with negative connotation sometime during the interview. No subjects mentioned the Indian House Crow in a positive light.

V Discussion

A Ornithological Survey/ Census

Habitat classified as coral-rag had the largest species richness, a total of 48 species noted, and the highest number of individuals observed (1241). A higher species richness and number of individuals noted in the coral-rag habitat may be due partially to sampling complications. In general coral-rag habitat points/transects offered more cover and had a visually smaller flush distance. Intertidal/mangrove habitat points/transects had often much less cover and a visually higher flush distance. Without adequate cover, birds also did not commonly return during the two minute settling period within intertidal/mangrove habitats.

Variability caused by flush distance may be noted as a larger Simpson Index standard deviation in the intertidal/mangrove habitat data as opposed to a lower Simpsons Index standard deviation in coral-rag habitat, 0.07 and 0.04 respectively.

Transect 1 suffered the most from flush distance factors as seen in Figure 1 above. The Simpson Index calculation points are not connected in this graph in order to note the issue of extreme flushing and remind that certain trends should not be inferred from the data. In transect 1, data was taken 10-30 meters from the marked GPS coordinates and also 30-100 meters from the marked point. The 30–100 meter data was not included in the analysis as there is no way to make the larger observed area data comparable to the smaller observed area data recorded at points in transects 2-6.

The mean Simpson's Index was greater for intertidal/mangrove habitat than coral-rag forest habitat, 0.25 and 0.17 respectively, indicating a lower diversity in the intertidal/mangrove habitat. A lower measure of diversity observed in the intertidal/mangrove habitat may be due to error and difficulty in sample measurement but also to biological reasons. It may be logical to

assume that habitats with a higher complexity will have the ability to support a higher species diversity due to there being more ecological niches to be filled. It would be difficult though to assume that the coral-rag habitat is more complex than the intertidal/mangrove. If the coral-rag habitat were more complex, this may explain a generally higher species diversity.

A total of 71 species and 1949 individuals were officially noted during recording times. Innumerable individuals were not counted during passing time, settling periods and leisure time. New species were also missed during these times of no data collection. Tips of tails and wings caught at glances indicated new species but were never able to be confidently confirmed as one species or another. On occasion a few specimens were well noted but could not be identified. Color variations or new migrant species not present in the utilized guides may be the issue or human error.

B Human Survey

Human surveys revealed many unexpected answers. All questions posed were open-ended questions allowing the interviewee large freedom in response. This made analysis more difficult and subjective. Answers had often to be categorized as opposed to displaying every variation of similar responses. Records were retained for future reference if necessary.

While the study did not appear to cause harm or stress to subjects it should be noted that some answers may have been affected by current politics and environmental regulation and caution to these regards. Another possible source of error arose out of a cultural norm to spend daily life in small groups. It was not uncommon that questions posed to one person were often aided in answer by another (ie- “how birds are there that you can name”). Group answering in most cases was unavoidable for the well-being of the participant and to avoid isolating participants.

Subjects were able to name a number of birds (2-26 different species). The highest number of mentioned species is much less than half of the noted species on Uzi. In part, this deficiency comes from the absence of knowledge of names and the pressure to relate names on-the-spot. It was inevitable that individuals are aware of more than two species, as the number of birds used as a food resource is greater than two. Individuals also grouped birds. An example of this is including all species of plovers as “kipwita/ kipwita pwita”. Many species of the same genus are also likely too similar to take note of variation. Some of these species take researchers time to identify by non-descript markings and vocalizations.

A small proportion (15/49) of subjects named a chicken “kuku” as “a bird they could name”. In most interviews chickens were in-view of the subject or within a few meters. The tendency to not name what seems an obvious species is suggestibly due to a high dependence on the chicken and use as food. Chickens do not appear to be associated with the term bird “ndege” but more associated with livestock and a means for survival. This is unlike many other referenced birds. Corresponding with this, chickens were named fourth most commonly, 4 times, as a “special bird in Uzi”. Birds are viewed generally with a positive stance by those interviewed. “Positive” answers were categorized as replies including “happy”, “good-heart”, and/or “very pleased”. If including replies categorized as "capturing/keeping” and “consuming” as positive responses within a “positive” category, 40/49 subjects responded positively to “what do you think when you see birds in Uzi”. Similar positive response was seen in response to “are birds important”, 47 of 49 subjects agreeing “yes”, “yes/very” or “yes/some”. Similar categorization was necessary with the question “what do we get from watching birds”. Answers of “pleasure”, “happiness”, “peace” etc… were categorized as “positive responses. These “positive” responses consumed the large majority of replies (32/49) including all neutral, negative and not-categorized

responses. “Special birds in Uzi” included responses of at least 18 different species (one species was unknown). The most commonly mentioned birds being used as food sources (domesticated pigeon (6) and the chicken (4)), named negatively (Indian House Crow (5)) or with significant traditional meaning (Green Wood-Hoopoe). The question was initially aimed at identifying uncommon birds that villagers had taken note of. For example, during early investigation into birds in Uzi a large raptor was noted to be inhabiting a tree in the village. The question was aimed at identifying more reclusive or less populous species. The unidentified “bird who cleans the water” may have been one such bird but remained unknown unfortunately.

Subjects responded that birds were generally disturbed by villagers but were not hunted on Uzi. Children were a common reply to both questions acting as both harassers and the ones to kill the birds. A few bird hunters were mentioned on the island to kill Crested Guinea-fowl and pigeons but many interviewees were either unaware of these people or did not consider the actions of few enough to answer “yes”. Children must grow out of this “stage”, as children were nearly the only persons noted to hunt birds.

Response to “do you think birds tell us how healthy the environment is” was difficult categorize. Nearly all subjects (45) responded “yes” but most continued to explain why/how. Elaborations were grouped as “scientific” or “traditional”. “Scientific” responses were those who mentioned the condition of the trees and forests as affecting bird health and therefore no birds indicates a degraded condition on the habitat and environment. “Traditional” responses were those explaining the actions of birds as indicating the fate of everyday life. For example “when a duck stretches his wings, it will rain” or a very common response “a specific call of the Green Wood-Hoopoe foretells the coming of rain”. “Scientific” responses totaled 7 while “traditional” responses created the majority of responses, 34. The format of the question left room for

interpretation allowing unexpected answers. Education level may have led to a traditional stance on the question as opposed to scientific. Subjects may not have had a level of environmental education to understand that certain creatures depend on the environment in a healthy condition and that the presence and health of such "indicators" rely the wellbeing of their habitat.

Specifically the study never concentrated on or inquired about the Indian House Crow. This introduced invasive species has been the subject of many previous studies due to its negative and undesirable impacts (Mwinyi & Said, 2009). Without prompting, the Indian House Crow was mentioned with a negative connotation in 14 of 49 interviews. This is more than the mention of any other species. Villagers commonly noted that this is the one bird "that should go". This lasting disdain may be assumed to rise from the crows destructive tendencies to take chicks endangering the livelihood of the villagers and harass native birds.

VI Conclusion

There are greater than 1,300 species of birds in East Africa and more than 2,170 species in the combined Africa and Madagascar (Bennun et al, 2002). In the limited habitats of Uzi Island alone this study recorded 71+ species. These birds are comprised of both resident and migrant species, forest and intertidal species. Difficulties in sampling due to large flushing distance in intertidal/mangrove habitats it is make it difficult to conclude that the species diversity of intertidal/mangrove habitats is less than that of coral-rag habitat but both are home to a plethora of specialized and necessary avian inhabitants. Local response notes the dependence birds have on the environment, as well as the villager's impact on the environment and lives of the birds. Local response is also overall positive to the lives and actions of the birds, sparing the Indian House Crow.

Considering local attitude and environmental wealth, Uzi Island could greatly benefit from the products of ecotourism, including the ecotourism of birds. Ecotourism may act as a means to support the local community and provide the incentive to responsibly utilize the environment. It should be noted though that while ecotourism may serve multiple positive purposes, it is not the whole solution. The data and connections presented in this study create a living record of avian species and, in order to preserve diversity, stresses the need for local environmental education and further research.

VI1 Recommendations

The presented study was restricted to three weeks. As with most specie or population studies, transects should be created and monitored for months/years to produce a better understanding of Uzi bird populations and ensure the census of every specie on Uzi Island. A long study would also not be as affected by variability in weather (the inability to take data on raining days) and time to better address complications: equipment malfunction, exhaustion, reclusive species, etc...

As the habitat of Uzi is converted into farmland and quickly developed, indicator species may be chosen and be the solitary species of study. Recording this species population and habitat preference and location insight will be given into the health of the environment in the organism's eye. One of these indicator species may include the Little Greenbul, *Andropadus v. virens*.

A specified study may be suggested on the Indian house crow, *Corvus s. splendens*. This species has been the host of many studies around Zanzibar as an invasive species. Data collected in this study suggests an issue with this species in the environment and distaste by local peoples.

As the means of change both positive and negative, the local people should be involved in a deeper inter-view based study concerning local knowledge and insight. Open and close-

ended questions should be posed to interviewed subjects. This would structure data and address more specific questions. Question posed in this study were generally “water-testing” questions to survey human inhabitant feeling. It should not be forgotten that the local people possess a wealth of knowledge and experience of the natural world.

Apart from avian fauna, many of Uzi Island’s inhabitants are pressured and under-going large population and habit transformations. Studies of the reptiles, mammals, fish, invertebrates etc…, would be beneficial to add to the collective knowledge of the organism and to again monitor the health of the island.

Effort should also be made to educate the local peoples about the other inhabitants of the island and the human dependency on them. It is inevitable for the health of the human inhabitants that expansion and resource use must continue. Education would help to decrease the impacts of these necessities through the awareness of the consumer.

VIII References

Bennun, L., Davies, G., Howell, K., Newing, H., & Linkie, M. (2002). African forest biodiversity, a field study manual for vertebrates. UK: Earthwatch Europe.

Bibby, C., Jones, M., & Marsden, S. (2000). *Expedition Field Techniques Bird Surveys.* Cambridge, CB3 0NA*:* Bird Life International.

Gregory, R. D., Gibbons, D. W., & Donald, P. F. (2004). Bird census and survey techniques. In Sutherland, W. J., Newton, A, & Green, R. E*., Bird ecology and conservation: a handbook of techniques* (pp. 17-55). New York, NY: Oxford University Press Inc.

Howe, R. W., Niemi, G. J., Lewis, S. J., & Welsh, D. A. (1997). A standard method for monitoring songbird populations in the Great Lakes region. *The Passenger Pigeon* 59 (3), 183-194.

Lindsey, P.A., Alexaander, A., Mills, M. G. L., Romanach, S., & Woodroffe, R. (2007). Wildlife viewing preferences of visitors to protected areas in South Africa: Implications for the role of ecotourism in conservation. *Journal of Ecotourism,* 6 (1), 19-33.

Menai Bay Conservation Area. Africa Vision, Dar es Salaam. Accessed October 15, 2013.

Mwinyi, A.A., & Said, T. A. (2009). Survey on population, distribution an socio-economic impacts of crows, in Zanzibar, Tanzania. Zanzibar, Tz: Department of Commercial Crops, Fruits and Forestry. Retrieved November 30, 2013 from http://dlist-asclme.org/sites/default/files/doclib/FINAL%20REPORT%20KUNGURU%20MACEMP%202009%20..pdf

Packenham, R. H. W. (1979). *The Birds of Zanzibar and Pemba: An annotated check-list*. London: British Ornithologists' Union.

Sekercioglu, C. H. (2002). Impacts of birdwatching on human and avian communities. *Environmental Conservation*, 29 (3), 282-289.

Simpson's Diversity Index. http://www.countrysideinfo.co.uk/simpsons.htm. Accessed October 15, 2013.

Stevenson, T., & Fanshawe, J. (2002). *Birds of East Afica, Kenya, Tanzania, Uganda, Rwanda, and Burundi*. Princeton, NJ: *Princeton University Press*.

Taussig, C. (2007). A survey of bird species on Misali Island, Pemba. Unpublished manuscript. SIT: Coastal Ecology and Natural Resource Management.

US Dept of State Geographer, Google (2013), & GeoBasis-DE/BKG (2009). *Google Earth*. (2013). Accessed October 14, 2013.

Uzi Island Conservation Society. *Uzi Sea Turtle Conservation*. (2013). Retrieved from http://www.zanzibar-ecotourism.org/. Accessed October 15, 2013.

Webb, H. (2003). Migratory Birds on Chumbe Island. Unpublished manuscript. SIT: Coastal Ecology and Natural Resource Management.

Zimmerman, D. A., Turner, D. A., & Pearson, D. J. (1999). *Birds of Kenya and Northern Tanzania*. London: Christopher Helm.

A Other References

Aliy Abdurahim Aily. (2013).

Iss-haka Hussein Abdallah. (2013).

Appendices

Appendix 1 – Transect Location and Description

Figure 1 -Official transects and randomized transect start points on Uzi Island, relative to Uzi and Ng'ambwa villages.

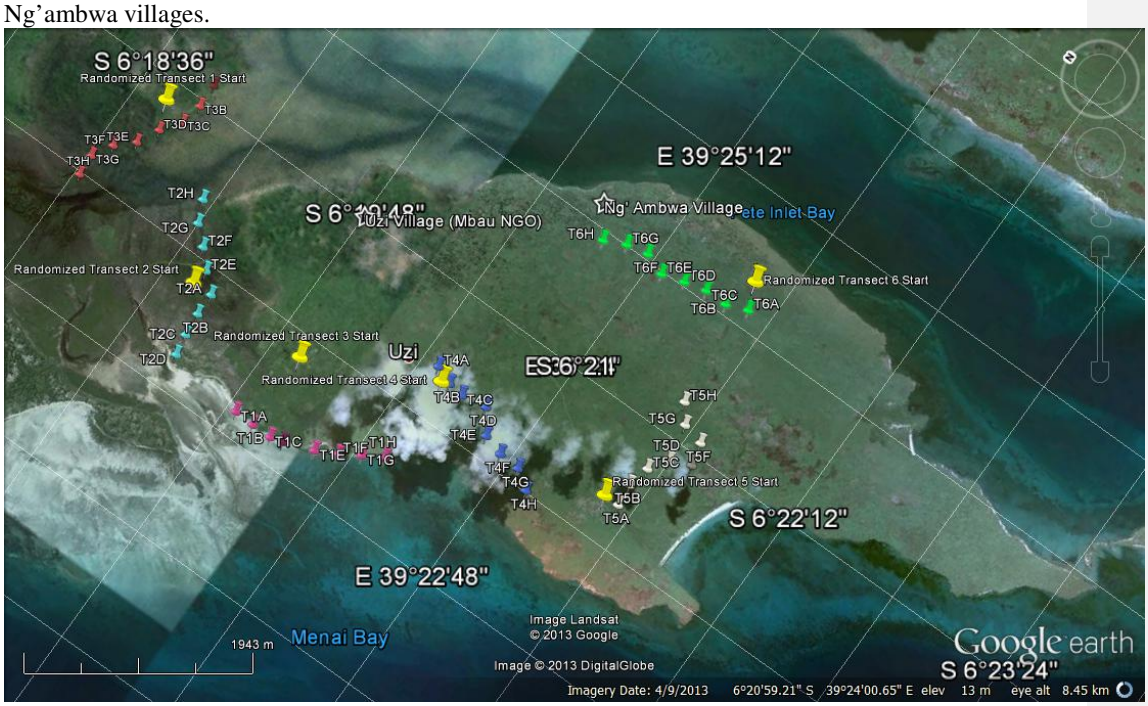

Figure 2 - Transect GPS location by point and site description by point.

Transect Number	Point	Coordinates	Notes
1	A	6° 19.859' S, 39° 22.877' E	Site: On distinct path in intertidal zone to Unguja Ukuu shores.
1	B	6° 19.957' S, 39° 22.874' E	Site: Intertidal zone
1	C	6° 20.056' S, 39° 22.874' E	Site: Intertidal zone
1	D	6° 20.116' S, 39° 22.891' E	Site: Intertidal zone
1	E	6° 20.258' S, 39° 22.944' E	Site: Intertidal off of Kichanga Chui
1	F	6° 20.356' S, 39° 22.994' E	Site: In front of rock face between Kichanga Chui and Kichanga Chaa

1	G	6° 20.449' S, 39° 23.054' E	Site: Intertidal zone off of Kichanga Chaa
1	H	6° 20.540' S, 39° 23.108' E	Site: Intertidal zone
2	A	6° 19.453' S, 39° 23.250' E	Site: Mangrove trees very close in tight channel, and navigation difficult. Very dense mangroves up to opening 30 meters away. Standing required for observation.
2	B	6° 19.455' S, 39° 23.142' E	Site: Flooded mangrove, individual and small groups of mangrove trees separated and randomly placed. Thicket of terrestrial trees approximately 50 meters away.
2	C	6° 19.465' S, 39° 23.031' E	Site: Flooded mangrove just behind large "bend" in boat path. Anchoring in bushes disturbs bushes and makes noise.
2	D	6° 19.483' S, 39° 22.931' E	Site: Half shore mangrove, point of observation approximately 10 meters off-shore. Half open view over channel to Jozani
2	E	6° 19.369' S, 39° 23.327' E	Site: Within main boat navigation "channel", approximately 15 meters across. Mangroves tall, approximately 6 meters in height.
2	F	6° 19.294' S, 39° 23.408' E	Site: Approximately 60 meters past road crossing, directly atop of seaweed farm lines. Channel 30 meters wide, large height variance of surrounding mangroves.
2	G	6° 19.212' S, 39° 23.484' E	Site: Channel approximately 40 meters across, mangroves 1-5 meters tall.
2	H	6° 19.166' S, 39° 23.587' E	Site: Mouth of channel into mangroves from bay. Boat anchored by rock in channel mouth. Closest mangrove stand approximately 30 meters on one side.
3	A	6° 18.899' S, 39° 24.051' E	Site: Channel to Jozani Forest Reserve, approximately 60 meters from shore.
3	B	6° 18.903' S, 39° 23.937' E	Site: 50% mangrove dense mangrove forest/ 50% completely open to channel/river. Located in river/channel bend.
3	C	6° 18.883' S, 39° 23.828' E	Site: 50% mangrove forest scattered and dead, 50% open to channel/river.
3	D	6° 18.815' S, 39° 23.736' E	Site: 50% mangrove dense mangrove forest/ 50% completely open to channel/river.
3	E	6° 18.764' S, 39° 23.630' E	Site: Boat sits directly in mangrove tree. 50% mangrove forest, 50% open channel/river. 10 meters ahead open to small waterway in direction of Jozani.
3	F	6° 18.684' S, 39° 23.554' E	Site: 50% mangrove dense mangrove forest/ 50% completely open to channel/river.
3	G	6° 18.629' S, 39° 23.456' E	Site: Edge of mangrove inlet populated by singular mangrove trees. 50%channel/river, 50% corner in inlet. Trees 1-7 meters tall. One large mangrove tree obstructs view to inlet.
3	H	6° 18.635' S, 39° 23.354' E	Site: 50% mangrove dense mangrove forest/ 50% completely open to channel/river. Located in river/channel bend.
4	A	6° 20.496' S, 39° 23.597' E	Site: Point located in small open area with ground brush, adjacent to larger open farm.

4	B	6° 20.583' S, 39° 23.562' E	Site: Small open farm with many short cut trees, enclosed by brush wall. Elevated rock near point to stand upon.
4	C	6° 20.660' S, 39° 23.551' E	Site: Located at end of dead-end path, very tight thicket. Opens to large sparse farm.
4	D	6° 20.782' S, 39° 23.537' E	Site: Open papaya farm surrounded by thick bush, mostly coral ground coverage. Location very difficult to get to.
4	E	6° 20.860' S, 39° 23.465' E	Site: Small patch of open area, coral-rag and dirt base. 5-6 medium (4 meter tall) within 10 meters of point.
4	F	6° 20.962' S, 39° 23.435' E	Site: Partial open farm, 50% dirt and 50% coral-rag base.
4	G	6° 21.067' S, 39° 23.429' E	Site: Half thicket and half cassava/coconut farm. Coconut trees approximately 4 meters tall.
4	H	6° 21.156' S, 39° 23.367' E	Site: Open circle, 25% covered by small (1.5 meters) bushes. Surrounded by dense vegetation wall.
5	A	6° 21.539' S, 39° 23.564' E	Site: Old banana farm off to the North. Rock precipice to the west. Many large coral rock boulders and 6 large (20 meter) tall fig trees.
5	B	6° 21.528' S, 39° 23.671' E	Site: Partially cleared farm of banana, coconut and papaya plants. Only one large fig tree (15 meters tall) within 30 meters of point. Point located on edge of farm.
5	C	6° 21.552' S, 39° 23.779' E	Site: Point is center of well cleared farm, sparse vegetation shorter than 0.5 meters. Mostly coral base, surrounded by thick bush. Small pine grove in SW corner.
5	D	6° 21.611' S, 39° 23.867' E	Site: Small patch of open coral-rag rock, tightly surrounded by bush 4-6 meters tall.
5	E	6° 21.707' S, 39° 23.913' E	Site: In farm clearing for bananas. No trees/bushes over 4 meters in height. Coral-rag base.
5	F	6° 21.681' S, 39° 24.019' E	Site: Edge of well cleared farm with brush thicket behind.
5	G	6° 21.575' S, 39° 24.046' E	Site: Located in small farm, adjacent to farm of point T5F. Farm less well developed than T5F but recently burned. Many 2.5-3 meters tall small diameter stumps.
5	H	6° 21.511' S, 39° 24.131' E	Site: Natural clearing with random distributed bushes. Brush 3-5 meters tall, coral-rag stone base very thick.
6	A	6° 21.503' S, 39° 24.647' E	Site: 30 meters off small foot-trail from village in farm clearing. Approximately 8 large coconut trees approximately 8 meters tall and many tall shrubs on farm.
6	B	6° 21.401' S, 39° 24.608' E	Site: End of bush trail in maze of small trails, located in small clearing (3 meter radius). Largely overgrown, trees/bushes 5-6 meters tall. Out of small clearing is dense thicket. Easy to get lost moving to point.
6	C	6° 21.292' S, 39° 24.607' E	Site: Farm clearing of coral-rag base, many young papaya and banana plants. Trees not generally taller than 5 meters, apart from single Baobab tree of 20 meters tall. 30 meters from point is a small goat and chicken coop.

6	D	6° 21.187' S, 39° 24.580' E	Site: Located within bramble thicket with small opening large enough to stand in. Vegetation 4 meters high.
6	E	6° 21.081' S, 39° 24.548' E	Site: Edge of farm surrounded by thick bush with coral-rag base. Many banana plants 30 meters away.
6	F	6° 20.977' S, 39° 24.586' E	Site: Large open within tomato farm. Surrounded by think bush but no trees within farm. All plants on farm shorter than 2 meters.
6	G	6° 20.873' S, 39° 24.565' E	Site: Edge of overgrown farm adjacent to well cleared farm. Separate from other farm and surrounded by thicket.
6	H	6° 20.772' S, 39° 24.517' E	Site: Enclosed, cleared farm (enclosed by coral fence). Surrounded by adjacent farm and THICK thicket. Farm appears recently burned.

Appendix 2 - Field Data Record Sheets/Human Interview Data Record Sheet

Figure 1 - Example of official avian field data recording sheet.

Field Data Record Sheet

Date/Time: **Weather:**

Location: **Observer/s:**

Transect no./name:

Transect/Point/ GPS	Time Count Initiated	Genus Species Code	Detection State (flyover/ typical)	No. Of Individuals Observed	Site Notes: Description, External Noise, etc.

Figure 2 - Official human interview questions and record sheet. Questions rephrased by translator after initially posed if necessary.

Human Interview – Birds and Uzi

Age/ Una miaka mingapi? Date/Time:

Gender/ mwanamme au mwanamke?

Profession/ Unafanya kazi gani?

Are there any birds on Uzi that you can name/ Jee kuna ndege aina ngapi kaitka kisiwa cha Uzi? Please mention/Tafadhali, wataje.

What do you think when you see birds in Uzi / Jee unawaza nini ukiwaona ndege humu Uzi?

Are birds important/ Jee ndege ni muhimu?

What do we get from watching birds/ Jee unapo tizama(kuangalia) unapo angalia ndege tunapata nini?

Do you know any special bird in Uzi / Je unamjua ndege yoyote maalum humu Uzi? Which/ Yupi? Where/ Yuko wapi?

Do you think birds are disturbed by villagers/ Je unafikiri ndege wanakerwa na wanakijiji? How and explain/ Vipi tafadhali elezea?

Are any of the birds hunted on Uzi/ Je watu wa Uzi wanawinda ndege? Which/ Ndege gani?

Do you think birds are affected by the condition of the environment/ Je unafikiri ndege wanaathiriwa na hali ya mazingira?

Do you think birds tell us how healthy the environment is/ Je unafikiri kuambia ndege wanatufahamisha hali ya mazinguera?

Appendix 3 – Species Survey/Census Data

Figure 1 – Cumulative list of species positively identified, local Kiswahili names, family, Latin name, assigned record code, total number of individuals officially recorded and the calculated species abundance. Species separate by mode of identification: sight or vocalization. Unknown species codes included last.

Identified/Confirmed by Sight

Common Name	Local Name (Kiswahili)	Family	Genus Species	Code	Total Number of Individuals Identified	Species Abundan
African Golden Weaver	Mnana	Ploceidae	*P. subaureus aureoflavus*	AGWV	10	0.599161
African Green Pigeon	Ninga	Columbidae	*Treron calva wakefieldi*	AFGP	5	0.299581
African Palm Swift	Kigamba Uchungu	Apodidae	*Cypsiurus parvus laemostigma*	APSW	54	3.23547
African Paradise Flycatcher	Shore Mavi	Monarchinae	*Terpsiphone viridis plumbeiceps*	AFFC	0	0
Batis (Species Unknown)	Tororo Tandiko	Platysteiridae	*Batis ….*	BATI	2	0.119832
Black Heron	Kula Stara	Ardeidae	*Egretta ardesiaca*	BLHE	1	0.059916
Black-and-White Mannikin	Tongo	Estrildidae	*Lonchura bicolor*	BWMA	0	0
Black-Backed Puffback	Tiva	Laniidae	*Dryoscopus cubla*	BBPB	1	0.059916
Black-Breasted Glossy Starling	Kuzi	Sturnidae	*Lamprotornis corruscus mandanus*	BBST	10	0.599161
Blue-Mantled Crested Flycatcher	Shore Ushungi	Monarchinae	*Trochocercus cyanomelas bivittatus*	BMFC	1	0.059916
Broad-Billed Roller	Jore	Coraciidae	*Eurystomus glaucurus suahelicus*	BBRO	8	0.479329
Bronze Mannikin	Tongo	Estrildidae	*Lonchura cucullata scutata*	BZMA	0	0
Cardinal Woodpecker	Gonota	Picidae	*Dendropicos fuscescens*	CAWP	0	0
Cattle Egret	Yange Yange	Ardeidae	*Bubulcus i. ibis*	CAEG	108	6.470941
Collared Sunbird	Chozi Kitii	Nectariniidae	*Anthreptes collaris garguensi*	COSB	1	3.475135
Common Bulbul	Shore Pili Pili	Pycnonotidae	*Pycnonotus barbatus*	COBB	46	2.756141
Common Drongo	Mramba	Dicruridae	*Dicrurus a. adsimilis*	CODR	16	0.958658
Common Greenshank		Scolopacidae	*Tringa nebularia*	CGSK	0	0
Common Sandpiper	Kipwitapwita	Scolopacidae	*Actitis hypoleucos*	COSP	58	0.059916
Crab-Plover	Membe	Dromadidae	*Dromas ardeola*	CRPL	1	0.059916

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Crested Guineafowl	Kororo	Phasianidae	*Guttera pucherani*	CRGF	0	0
Crowned Hornbil	Fembe	Bucerotidae	*Tock alboterminatus*	CRHO	6	0.359497
Curlew Sandpiper	Kipwitapwita	Scolopacidae	*Calidris ferruginea*	CLSP	9	0.539245
Dark-Backed Weaver	Biti Chumu	Ploceidae	*Ploceus bicolor*	DBWV	10	0.599161
Dimorphic Egret	Korongo Mweusi	Ardeidae	*Egretta (garzetta) dimorpha*	DIEG	35	2.097064
East Coast Akalat		Muscicapidae	*Sheppardia gunningi sokokensis*	ECAK	1	0.059916
Eastern Bearded Scrub Robin	Kumbizi	Muscicapidae	*Cercotrichas q. quadrivirgata*	EBSR	10	0.599161
Eastern Nicator	Kuruwiji Madoto	Pycnonotidae[+]	*Nicator gularis*	EANI	4	0.239664
Emerald-Spotted Wood Dove	Bawa la Ninga	Columbidae	*Turtur chalcospilos*	ESWD	20	1.198322
Eurasian Golden Oriole	Mnandi	Oriolodae	*Oriolus o. oriolus*	EGOR	2	0.119832
Golden Palm Weaver	Mnana	Ploceidae	*P. bojeri*	GPWV	29	1.737567
Green Wood-Hoopoe	Gole Gole	Phoeniculidae	*Phoeniculus purpureus*	GWHO	0	0
Green-Backed/Striated Heron	Kiseneda	Ardeidae	*Butorides striatus atricapillus*	STHE	5	0.299581
Grey Heron	Korongo Mkubwa	Ardeidae	*Ardea c. cinera*	GRHE	0	0
Grey Plover		Charadriidae	*Pluvialis squatarola*	GRPL	0	0
Grey-Backed Camaroptera	Kita Chui/ Tachui	Muscicapidae	*Camaroptera brachyura*	GBCA	47	2.816058
House Sparrow	Kibade Mchele	Passerinae	*Passer domesticus indicus*	HOSP	0	0
Indian House Crow	Kunguru	Corvidae	*Corvus s. splendens*	IHCR	204	12.22289
Lesser Striped-Swallow	Kijumba Mshare	Hirundinidae	*Hirundo abyssinica unitatis*	LSSW	49	2.93589
Lilac-Breasted Roller	Jore	Coraciidae	*Coracias caudata*	LBRO	9	0.539245
Little Egret	Korongo Mweupe	Ardeidae	*Egretta g. garzetta*	LTEG	3	0.179748
Little Purple-Banded Sunbird	Hariri/ Chozi Kichaa	Nectariniidae	*Nectarinia bifasciata*	LPSB	29	1.737567
Little-Ringed Plover	Watoto wa Kuku	Charadriidae	*Charaadrius dubius curonicus*	LRPL	14	0.838826
Long-Tailed Comorant	Kibata Uziwa	Phalacrocoracidae	*Phalacrocorax a. africanus*	LTCO	38	2.276812
Madagascar Bee-Eater	Mkatare/ Katale	Meropidae	*Merops s. superciliosus*	MABE	65	3.894548
Mangrove Kingfisher	Dete	Alecedinidae	*Halcyon senegaloides*	MAKF	2	0.119832

Mottled Spinetail	Kigamba Uchungu	Apodidae	*Telacanthura ussheri stictilaema*	MOST	15	0.898742
Mouse-Coloured Sunbird	Chozi Muhogo	Nectariniidae	*Nectarinia veroxii fischeri*	MCSB	22	1.318155
Olive Sunbird	Chozi Magomba	Nectariniidae	*Nectarinia chloropygia orphogaster*	OLSB	3	0.179748
Pale Flycatcher		Muscicapidae	*Bradornis pallidus murinus*	PAFC	4	0.239664
Pied Kingfisher	Dete	Alecedinidae	*Ceryle r. rudis*	PIKF	0	0
Purple Heron	Korongo	Ardeidae	*Ardea p. purpurea*	PUHE	3	0.179748
Red-Capped Robin-Chat	Kumbizi	Muscicapidae	*Cossypha natalensis intensa*	RCRC	1	0.059916
Red-Eyed Dove	Hua	Columbidae	*Streptopelia semitotquata*	REDO	95	5.692031
Ringed Plover	Watoto wa Kuku	Charadriidae	*Charadrius hiaticula tundrae*	RIPL	5	0.299581
Ruddy Turnstone	Kibiruwa Mawe	Scolopacidae	*Arenaria i. interpres*	RUTS	2	0.119832
Scarlet-Chested Sunbird	Chozi Moto	Nectariniidae	*Nectarinia senegalensis lamperti*	SCSB	46	2.756141
Senegal Plover	Chokoa Kaa	Charadriidae	*Vanellus lugubris*	SGPL	8	0.479329
Sooty Gull	Shakwe	Laridae	*Larus hemprihii*	SOGU	8	0.479329
Striped Kingfisher	Dete	Alecedinidae	*Halcyon c. chelicuti*	STKF	1	0.059916
Tambourine Dove	Pugi Unga	Columbidae	*Turturt tympanistria*	TADO	5	0.299581
Terek Sandpiper	Kipwita	Scolopacidae	*Xenus cinereus*	TKSP	0	0
Tropical Boubou		Lanniidae	*L. f. sublacteus*	TRBB	1	0.059916
Water Thick-Knee	Umbwaji	Burhinidae	*Burhinus v. vermiculatus*	WTKN	5	0.299581
Whimbrel	Sururu	Scolopacidae	*Numenius p. phaeopus*	WHBL	27	1.617735
White-Browed Coucal	Tipi Tipi	Cuculidae	*Centropus s. superciliosus*	WBCO	36	2.15698
Yellowbill	Titi	Cuculidae	*Ceuthmochares a. aereus*	YWBL	7	0.419413
Yellow-Breasted Apalis		Cisticolidae	*Apalis flavida*	YBAP	5	0.299581
Yellow-Rumped Tinkerbird	Kitororo	Capitonidae	*Pogoniulus bilineatus*	YRTK	39	2.336729
Zanzibar Sombre Greenbul	Kuruwiji Makelele	Pycnonotidae	*Andropadus importunus*	ZSGB	417	24.98502
Identified/Confirmed Strictly by Sound						
Little Greenbul	Kuruwiji Machokeo	Pycnonotidae	Andropadus v. virens	LTGB	1	0.059916
Record Codes for Unknown Birds						
Unknown Starling				UNK ST		

Unknown Swift				UNK SWF		
Unknown Greenbul				UNK GB		
Unknown Dove				UNK DO		
Unknown Weaver				UNK WV		
Unknown Sunbird				UNK SB		
Unidentified Bird				UNK		
Unknown Heron				UNK HE		
Unknown Plover				UNK PL		